LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Jan. 9-13, 2012

January 12, 2012
Newsday

JUST ONE WORD: PLASTICS

Natalia Zaitseva, an LLNL materials scientist, leads a team of Lab researchers that has developed the first plastic material capable of efficiently distinguishing neutrons from gamma rays, something not thought possible for the past five decades or so.

When Dustin Hoffman as Benjamin Braddock was advised to pursue a career in plastics in the 1967 movie "The Graduate," people could not have envisioned one of the material uses developed by Laboratory scientists.

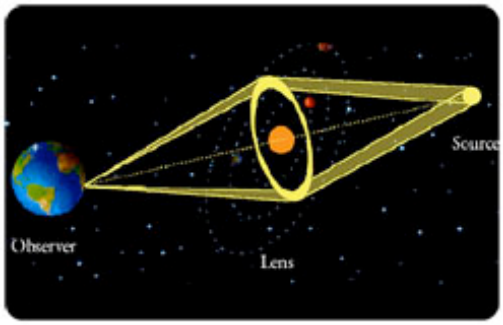
In a key discovery, a team of LLNL researchers has developed the first plastic material capable of efficiently distinguishing neutrons from gamma rays, something not thought possible for the past five decades or so.

As a result, the new technology could assist in detecting nuclear substances such as plutonium and uranium that might be used in improvised nuclear devices by terrorists. It also could help in detecting neutrons in major scientific projects.

With the material's low cost, huge plastic sheets could be formed easily into dramatically larger surface areas than other neutron detectors currently used, and could aid in the protection of ports, stadiums and other large facilities.

To read more, go to *Newsday*.

redOrbit WE ARE NOT ALONE



Gravitational microlensing occurs when light from a source star is bent and focused by gravity as a second object (the lens star) passes between the source star and an observer on Earth.

There are more exoplanets further away from their parent stars than originally thought, according to new astrophysics research.

What this points to is that there are more planetary systems resembling our Milky Way rather than being significantly different.

In new research, Lab astrophysicist Kem Cook as part of an international collaboration, analyzed microlensing data that bridges the gap between a recent finding of planets further away from their parent stars and observations of planets extremely close to their parent star.

Gravitational microlensing occurs when light from a source star is bent and focused by gravity as a second object (the lens star), which passes between the source star and an observer on Earth. A planet rotating around the lens star will produce an additional deviation in the microlensing. The first gravitational microlensing observations were made by the Massive Astrophysical Compact Halo Object (MACHO) collaboration, led by Livermore scientists.

An exoplanet is a planet outside our solar system. Over the past 16 years, astronomers have detected more than 700 confirmed exoplanets and have started to probe the spectra and atmospheres of these worlds. While studying the properties of individual exoplanets is undeniably valuable, a much more basic question remains: How commonplace are planets in the Milky Way?

To read more, go to *Red Orbit*.

KGO NEWSTALK AM810

BETTER DIAGNOSIS IN AN INSTANT

Electronics engineer Gary Johnson tests a new polymerase chain reaction (PCR) instrument that can process biological samples in less than three minutes.

Ever had a bad flu and wondered if it was something worse?

The test to typically identify your ailment would be run in a central lab and take several days. But Livermore researchers plan to cut that time down to less than 10 minutes -- while you're still in your doctor's office.

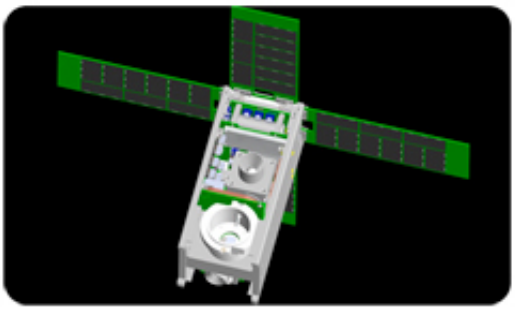
The Laboratory has developed a technique that identifies viral and bacterial DNA on the spot.

"It would tell you very quickly whether someone needed antibiotics," said lead researcher Reg Beer.

To hear the interview, go to *KGO Radio*.

The Morehead News

CHECKING BACKGROUND



The Cosmic X-Ray Background Nanosatellite

Lab postdoctoral researcher Lance Simms has spent a year of his life waiting for it to happen: He and a team from Morehead State University Space Science Center delivered a satellite to NASA's Launch Services Program, marking a major milestone in the Space Science Nanosatellite program.

The Cosmic X-Ray Background Nanosatellite (CXBN) was developed during the past year and passed rigorous space environment testing and design reviews.

Simms played a critical role in the project by modeling and simulating the detector onboard the nanosatellite and also wrote the control software that moves the spacecraft.

When launched in August, the satellite will make observations of the diffuse X-ray background and publish the data**.**

To read more, go to *The Morehead News*.

weatherwise
THE POWER, THE BEAUTY, THE EXCITEMENT

WHICH WAY THE WIND BLOWS

The control room at the National Atmospheric Release Advisory Center at the Laboratory.

When airborne toxic substances are present, you really do need to know which way the wind blows.

And specifically, you want the meteorologists, modelers and other experts at the Laboratory's National Atmospheric Release Advisory Center (NARAC) telling you. Last March, soon after the Fukushima Dai-ichi Nuclear Power Plant accident occurred in Japan, NARAC hit the ground running.

During the days and weeks following the crisis, NARAC issued dozens of forecasts and analyses, including daily weather forecasts of atmospheric transport predictions in support of measurements, surveys, estimates of possible radiation doses in Japan, and estimates of plume arrival times and dose estimates for locations in the United States.

NARAC is tasked as the U.S. government's primary forecaster of the direction the bad stuff -- from burning barrels or tires to biohazards to nuclear radiation -- will spread, and its concentration. The scope of the NARAC mission has grown almost exponentially since its inception in 1973, when the Department of Energy asked LLNL about the feasibility of a developing a computer-based system to estimate radiation levels following a U.S. nuclear emergency.

To read more, go to *Weatherwise*.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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